Hematologic Values in a Selected Normal Group of Bangkok School Children

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OBJECTIVE : To determine the normal hematologic values on a select group of Bangkok students, of the ages of 6 to 9 years, accepted as clinically free of significant disease.

BACKGROUND : Clinical values in hematology, when reference normals are unavailable, are generally accepted as those presented by Wintrobe and others (1-4). Age differences for pediatric, adolescent, and adult groups have been presented and are generally accepted (3, 5, 6). Values for narrow age-range groups have been reported to be significantly different from standard literature references (8). This laboratory has been studying a group of Bangkok school children, students at the Phibunprachasan School (6, 7). A requirement for definition of normal hematologic values with respect to these children provided the impetus for this study.

METHOD : The children, aged 6 to 9, are healthy Thai children participating in a longitudinal dengue hemorrhagic fever study. All are students of a lower middle class public school in Bangkok. Venous blood was drawn, preserved in disodium EDTA, and assayed within 7 hours of being drawn.

Hematocrits were performed by micro-capillary tube centrifugation, hemoglobins measured spectrophotometrically by the Cyanmethemoglobin method using Drabkins solution, white blood cell counts by microscope and hemocytometer, sedimentation rates by the method of Wintrobe and Landsberg, and white blood cell differential counts by microscopic examination of Wright's stained thin film smears. The children's age, sex, height and weight was obtained during the blood drawing.

RESULTS : Table 1 shows the results of the study group and Table 2 provides comparison data from standard reference literature. Due to the small number sampled, tests of statistical significance were not performed and data is intended only to represent guideline information. There appears to be a difference in band neutrophile and eosinophile percentages. No explanation for the band neutrophile percentage difference is apparent. The eosinophila may be due to the endemicity of parasitic infections in Thailand. However, no efforts were made to confirm this and the children were considered normal based on history and inspection.

REFERENCES

1. Castleman, B. and McNeely, J. 1974. Case records of the Massachusetts General Hospital. N. Engl. J. Med., 290:39-49.

2. Clinical normal ranges. US Army Hospital, West Point, N.Y. 1974.

3. Normal values for pediatric clinical chemistry. August, 1974. Preliminary Committee Report of the American Association of Clinical Chemists. Ross Laboratories, Columbus, Ohio.

4. Wintrobe, M.M. 1933. Blood of normal men and women. Bull. Johns Hopkins Univ. Hosp., 53:118.

5. Wintrobe, M.M. 1967. Clinical hematology. 6th ed., Philadelphia, Lea and Febiger.

6. Scott, R.M., Snitbhan, R., Nisalak, A. and Segal, H.E. 1977. A longitudinal epidemiological study of dengue virus infections in a school population. AFRIMS USAMC Annual Report. 50-54.

7. Snitbhan, R., Nisalak, A., Scott, R.M., and Johnson, D.E. 1978. A longitudinal serological study of a lower socioeconomic school population. AFRIMS USAMC Annual Report. 96-108.

8. Spaulding, S.A., Gate, J.C. and Crum, J.W. 1978. Age dependence in hematological parameters of young adults: A study of the United States Corps of Cadets. Military Medicine. 143:700-702.

TABLE I

STUDY VALUES

(E.L.: Extreme Low, M ± 1: Mean ± 1 standard deviation, E. H. : Extreme High)

	TOTAL : n = 40 Age : 6–9			MALE : n = 20 Age : 6–9			FEMALE : n = 20 Age : 6–9		
	Age / n			Age / n			Age / n		
	6 / 10			6 / 5			6 / 5		
	7 / 10			7 / 5			7 / 5		
	8 / 10			8 / 5			8 / 5		
	9 / 10			9 / 5			9 / 5		
	E. L.	M ± 1	E. H.	E. L.	M ± 1	E. H.	E. L.	M ± 1	E. H.
Height (In.)	38	64.4 ± 2.9	50	38	45.7 ± 3.2	50	41	47.0 ± 2.5	49
Weight (Kg)	15	19.6 ± 2.6	25	15	19.0 ± 2.5	24	15	20.2 ± 2.7	25
Hematocrit (%)	32	37.5 ± 1.97	42	32	37.1 ± 2.3	41	35	37.9 ± 1.6	42
Hemoglobin (gm)	10.6	12.4 ± 0.87	14.3	10.6	12.3 ± 0.9	13.7	11.0	12.5 ± 0.8	14.3
White blood cells (10^3)	5.1	8.96 ± 2.48	15.2	5.8	8.71 ± 2.07	12.5	5.1	9.20 ± 2.88	15.2
Sedimentation rate (mm/hr)	5	18 ± 10	43	5	18 ± 10	39	5	18 ± 11	43
Neutrophiles (%)	23	47 ± 11	75	25	51 ± 12	59	23	43 ± 10	54
Band Neutrophiles (%)	0	2 ± 0.9	4	0	2 ± 0.7	3	0	2 ± 1.2	4
Lymphocytes (%)	15	40 ± 10	64	15	35 ± 10	55	30	44 ± 9	64
Monocytes (%)	0	5 ± 2	10	2	5 ± 3	8	0	5 ± 2	8
Eosinophiles (%)	1	7 ± 6	27	3	7 ± 5	10	1	7 ± 6	27
Basophiles (%)	0	1 ± 0.3	2	0	1 ± 0.3	1	0	1 ± 0.3	2

SCHOOL CHILDREN, NORMAL POPULATION, PHIBUNPRACHASAN SCHOOL, 1979
DINDAENG AREA, BANGKOK, THAILAND.

Table 2. Comparative Reference Values*

Age 6-9 (97%)	male	female
Height (in.)	49.7-57.2	49.4-56.5
Weight (kg.)	27.7-40.8	26.6-40.8

	Age 6-10	Age 8-12	Age 21	Adult
Hematocrit (%)		40		37-54
Hemoglobin (gm)		13.0-15.5		11-18
White blood cells (10^3)		8		5-10
Sedimentation rate (mm/hr)				0-15
Neutrophiles (%)	43-61		46-66	
Band neutophiles (%)	6-11		5-11	
Lymphocytes (%)	42-48		24-44	
Monocytes (%)	4.3-4.7		4	
Eosinophiles (%)	2.4-2.7		2.7	
Basophiles (%)	0.5-0.6		0.5	

* IN: (1) Jacques Wallack. 1974. Interpretation of diagnostic test. 2nd. ed. p.4-7. Little, Brown and Co., Boston.

(2) Henry K. Silver, Kempe, C.H., and Bruyn, H.B. 1977. Handbook of pediatrics, 12th. ed., p. 672-673. Lange Medical Publications, Los Altos, Calif.